General

Guideline Title

Guidelines on the management of anaemia and red cell transfusion in adult critically ill patients.

Bibliographic Source(s)

Retter A, Wyncoll D, Pearse R, Carson D, McKechnie S, Stanworth S, Allard S, Thomas D, Walsh T, British Committee for Standards in Haematology. Guidelines on the management of anaemia and red cell transfusion in adult critically ill patients. Br J Haematol. 2013 Feb;160(4):445-64. [148 references] PubMed

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

Definitions for the quality of the evidence (A-C) and strength of recommendation (strong [grade 1], weak [grade 2]) are given at the end of the "Major Recommendations" field.

Transfusion Triggers in General Critical Care Populations

- A transfusion threshold of 70 g/l or below, with a target haemoglobin (Hb) range of 70–90 g/l, should be the default for all critically ill patients, unless specific co-morbidities or acute illness-related factors modify clinical decision-making (Grade 1B).
- Transfusion triggers should not exceed 90 g/l in most critically ill patients (Grade 1B).

Alternatives to Red Cell Transfusions

- Erythropoietin should not be used to treat anaemia in critically ill patients until further safety and efficacy data are available (Grade 1B).
- In the absence of clear evidence of iron deficiency, routine iron supplementation is not recommended during critical illness (Grade 2D).

Blood Sampling Techniques to Reduce Iatrogenic Blood Loss

- The introduction of blood conservation sampling devices should be considered to reduce phlebotomy-associated blood loss (Grade 1C).
- Paediatric blood sampling tubes should be considered for reducing iatrogenic blood loss (Grade 2C).

Adverse Consequences Associated with Red Blood Cell (RBC) Transfusion in Critical Care

- Pre-transfusion clinical assessment should be undertaken including concomitant medical conditions that increase the risk of transfusion-associated circulatory overload (TACO) (cardiac failure, renal impairment, hypoalbuminaemia, fluid overload) (Grade 1D).

- Attention to the rate of transfusion together with careful fluid balance and appropriate use of diuretic cover (e.g., furosemide) can reduce the risk of TACO (Grade 1D).
- Patients developing acute dyspnoea with hypoxia and bilateral pulmonary infiltrates during or within 6 h of transfusion should be carefully assessed for the probability of transfusion-related acute lung injury (TRALI) and patients should be admitted to a critical care area for supportive treatment and monitoring (Grade 1D).
- Any adverse events or reactions related to transfusion should be appropriately investigated and reported via systems for local risk management, and also to National Haemovigilance Schemes (Grade 1D).

RBC Storage Duration

- The evidence base is insufficient to support the administration of "fresher blood" to critically ill patients (Grade 2B).

Critically Ill Patients with Sepsis

- In the early resuscitation of patients with severe sepsis, if there is clear evidence of inadequate global oxygen delivery (DO_2), transfusion of RBCs to a target Hb of 90–100 g/l should be considered (Grade 2C).
- During the later stages of severe sepsis, a conservative approach to transfusion should be followed with a target Hb of 70–90 g/l (Grade 1B).

RBC Transfusion in Neurological Critical Care

Traumatic Brain Injury

- In patients with traumatic brain injury (TBI) the target Hb should be 70–90 g/l (Grade 2D).
- In patients with TBI and evidence of cerebral ischaemia the target Hb should be >90 g/l (Grade 2D).

Subarachnoid Haemorrhage

- In patients with subarachnoid haemorrhage (SAH) the target Hb should be 80–100 g/l (Grade 2D).

Ischaemic Stroke

- In patients presenting to the intensive care unit (ICU) with an acute ischaemic stroke the Hb should be maintained above 90 g/l (Grade 2D).

RBC Transfusion for Patients with Ischaemic Heart Disease

- Anaemic critically ill patients with stable angina should have a Hb maintained >70 g/l, but transfusion to a Hb >100 g/l has uncertain benefit (Grade 2B).
- In patients suffering from acute coronary syndrome (ACS) the Hb should be maintained at >80-90 g/l (Grade 2C).

Weaning

- Red cell transfusion should not be used as a strategy to assist weaning from mechanical ventilation when the Hb is >70 g/l (Grade 2C).

Definitions:

Strength of Recommendations

Strong (grade 1): Strong recommendations (grade 1) are made when there is confidence that the benefits do or do not outweigh harm and burden. Grade 1 recommendations can be applied uniformly to most patients. Regard as 'recommend'.

Weak (grade 2): Where the magnitude of benefit or not is less certain a weaker grade 2 recommendation is made. Grade 2 recommendations require judicious application to individual patients. Regard as 'suggest'.

Quality of Evidence

(A) High: Further research is very unlikely to change confidence in the estimate of effect. Current evidence derived from randomised clinical trials without important limitations.

(B) Moderate: Further research may well have an important impact on confidence in the estimate of effect and may change the estimate. Current evidence derived from randomised clinical trials with important limitations (e.g., inconsistent results, imprecision - wide confidence intervals or methodological flaws - e.g., lack of blinding, large losses to follow up, failure to adhere to intention to treat analysis), or very strong evidence from

observational studies or case series (e.g., large or very large and consistent estimates of the magnitude of a treatment effect or demonstration of a dose-response gradient).

(C) Low: Further research is likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate. Current evidence from observational studies, case series or just opinion.

(D): Expert opinion only.

Clinical Algorithm(s)

The original guideline document contains a clinical algorithm on a suggested approach to transfusion in critical care.

Scope

Disease/Condition(s)

Critical illness with anaemia when major haemorrhage is not present

Guideline Category

Evaluation

Management

Risk Assessment

Treatment

Clinical Specialty

Cardiology

Critical Care

Hematology

Internal Medicine

Neurology

Pulmonary Medicine

Surgery

Intended Users

Advanced Practice Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To summarize the current literature guiding the use of red cell transfusion in critically ill patients and provide recommendations to support clinicians in their day-to-day practice

Target Population

Adult patients with critical illness with anaemia when major haemorrhage is not present

Interventions and Practices Considered

1. Consideration of transfusion threshold
2. Consideration of target haemoglobin range
3. Consideration of transfusion triggers
4. Introduction of blood conservation devices
5. Pre-transfusion clinical assessment including concomitant medical conditions
6. Consideration of the rate of transfusion together with careful fluid balance and appropriate use of diuretic cover
7. Investigation and management of adverse events and reactions
8. Consideration of storage duration

Major Outcomes Considered

- Mortality
- Morbidity
- Rate of new organ failure
- Rate of acute respiratory distress syndrome
- Efficacy/effectiveness of erythropoietin administration
- Level of blood loss
- Severity of anaemia
- Level of red blood cell use
- Cerebral oxygenation levels
- Rate of adverse cardiac events/cardiovascular complications in patients with ischaemic heart disease
- Speed and success of weaning from mechanical ventilation and extubation
- Incidence of adverse effects from red cell transfusion

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

A MEDLINE database search was conducted from its inception to December 2011 using a range of broad search terms relating to red cell transfusion, critical care, and intensive care. The search strategy is available from the authors of the original guideline document on request. The search yielded 4,856 papers. These were sub-divided according to the pre-defined subcategories and reviewed by sub-group members allocated to each part of the guideline. At least two group members contributed to each subcategory section. Using this approach, a total of 508 relevant papers were extracted and reviewed in full. Recent systematic reviews and guidelines produced by other groups were also reviewed where available.

Number of Source Documents

A total of 508 relevant papers were extracted and reviewed in full.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Quality of Evidence

The quality of evidence is graded as high (A), moderate (B) or low (C). To put this in context it is useful to consider the uncertainty of knowledge and whether further research could change what is known or is certain.

(A) High: Further research is very unlikely to change confidence in the estimate of effect. Current evidence derived from randomised clinical trials without important limitations.

(B) Moderate: Further research may well have an important impact on confidence in the estimate of effect and may change the estimate. Current evidence derived from randomised clinical trials with important limitations (e.g., inconsistent results, imprecision – wide confidence intervals or methodological flaws – e.g., lack of blinding, large losses to follow up, failure to adhere to intention to treat analysis), or very strong evidence from observational studies or case series (e.g., large or very large and consistent estimates of the magnitude of a treatment effect or demonstration of a dose-response gradient).

(C) Low: Further research is likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate. Current evidence from observational studies, case series or just opinion.

(D): Expert opinion only.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The quality of evidence was judged by predefined Grades of Recommendation, Assessment, Development and Evaluation (GRADE) criteria, details of which can be found in Table 1 in the original guideline document.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The writing group was selected by the British Committee for Standards in Haematology (BCSH) Transfusion Task Force with input from the Intensive Care Society to provide expertise in relevant physiology, pathophysiology, general intensive care, and specific subgroups of critically ill patients.

The guideline authors did not undertake a formal systematic literature review. They agreed *a priori* a range of issues relating to general intensive care patients, and specific sub-groups of patients with relevant co-morbidities. These were subcategories relating to general intensive care, weaning from mechanical ventilation, ischaemic heart disease (IHD), sepsis, and neurocritical care.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendations

Strong (grade 1): Strong recommendations (grade 1) are made when there is confidence that the benefits do or do not outweigh harm and burden. Grade 1 recommendations can be applied uniformly to most patients. Regard as 'recommend'.

Weak (grade 2): Where the magnitude of benefit or not is less certain a weaker grade 2 recommendation is made. Grade 2 recommendations require judicious application to individual patients. Regard as 'suggest'.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate management of anaemia and red cell transfusion in adult critically ill patients

Potential Harms

- Most cohort studies show associations between transfusion and adverse patient outcomes, including death, organ failure progression, infection and prolonged hospital stay.
- The risks of transfusion in the critically ill include those common to all blood transfusions (e.g., errors in administration) and those more specific to individual blood components (e.g., bacterial contamination in platelet transfusions).
- In critically ill patients, transfusion-associated lung injury (TRALI) and transfusion-associated circulatory overload (TACO) are particularly relevant complications.

Qualifying Statements

Qualifying Statements

- Critically ill patients differ in their age, diagnosis, co-morbidities, and severity of illness. These factors influence their tolerance of anaemia and alter the risk to benefit ratio of transfusion. The optimal management for an individual may not fall clearly within the recommendations and each decision requires a synthesis of the available evidence and the clinical judgment of the treating physician.
- While the advice and information in these guidelines is believed to be true and accurate at the time of going to press, neither the authors, the British Society for Haematology, nor the publishers accept any legal responsibility for the content of these guidelines.
- This guideline relates to the use of red cells to manage anaemia during critical illness when major haemorrhage is not present. A previous British Committee for Standards in Haematology (BCSH) guideline has been published on massive haemorrhage, but this is a rapidly changing field. The author's recommend that readers consult recent guidelines specifically addressing the management of major haemorrhage for evidence-based guidance. A subsequent BCSH guideline will specifically cover the use of plasma components in critically ill patients.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Safety

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2012 Dec

Guideline Developer(s)

British Society for Haematology Guidelines - Professional Association

Source(s) of Funding

British Committee for Standards in Haematology

Guideline Committee

Not stated

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the British Journal of Haematology Web site .

Print copies: Available from the British Committee for Standards in Haematology; Email: bcsh@b-s-h.org.uk.

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on April 24, 2013. The information was verified by the guideline developer on May 23, 2013.

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